

TABLE 1.—LENGTHS OF VARIOUS PARTS OF SEEDLINGS OF *COIX LACHRYMA-JOBI* L., HALF OF WHICH WERE GROWN WHOLLY IN THE DARK, THE OTHER HALF SUBJECTED TO A SINGLE EXPOSURE OF 100 F.C. HOURS MAZDA ILLUMINATION WHEN 2 TO 5 CM TALL.

Character	Light exposure		Difference
	Dark throughout	100 F.C. hours	
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
Mesocotyl.....	253.71 ± 8.94	133.41 ± 7.90	120.30 ± 11.93
Coleoptile.....	30.32 ± 1.33	30.27 ± 1.11	.05 ± 1.74
First sheath.....	40.87 ± 1.41	56.30 ± 1.75	15.43 ± 2.25
Second internode.....	—	54.19 ± 3.78	—
First true leaf.....	82.56 ± 6.33	144.96 ± 6.71	62.40 ± 9.22

to the brief illumination. Evidently the mesocotyl of *Coix* is much more sensitive to light than is the maize mesocotyl, although this has not been tested beyond the reduction in length effected by 100 F.C. hours. In maize it has been possible to detect the effect of 1,000 F.C. seconds, and it would appear to be possible with *Coix* to measure the response to even smaller amounts of light.

The failure of *Coix* to elongate the internode between the coleoptile and the bladeless sheath is suggestive that this sheath and the coleoptile are more intimately related in function than is the case with maize. The greater sensitivity of *Coix* to light, as compared with maize, and the extensive elongation of *Coix* mesocotyls, together with the close physical association of the coleoptile and bladeless sheath, suggests that both these latter organs produce the growth substance required for mesocotyl elongation.

ZOOLOGY.—*Ostracoda from Puerto Rican bromeliads*.<sup>1</sup> WILLIS L. TRESSLER, University of Maryland. (Communicated by WALDO L. SCHMITT.)

It has been about 60 years since the first discovery of Entomostraca in the leaf cups of bromeliads in southern Brazil. Since then this habitat has been investigated in several places, and a long list of animal forms has been assembled, many of which are found almost exclusively in this peculiar situation.

The bromeliads are large tropical plants built on the lines of a century plant or the pineapple, which is a member of this group. The leaves, which may be several feet in length, are arranged in a spiral fashion with overlapping bases, which form little cups in which rain water collects. Bromeliads are mainly epiphytic on the large trees of tropical America but are found also in most botanical gardens of

<sup>1</sup> Received March 12, 1941.

temperate regions where they thrive under glass. The cups at the leaf bases are filled with decomposing debris and water, and in the water or among the debris or attached to the sides of the leaves are to be found a great variety of organisms, including copepods, ostracods, and worms.

The first report on Entomostraca inhabiting the leaf cups of bromeliads was made by Fritz Müller in 1880 (Müller, 1880) and concerned the discovery of various microscopic animals that he had found in these reservoirs in southern Brazil. Included was a new species of ostracod, which was described the following year (Müller, 1881). More recently, Picado (1913) in his masterly study of the organisms to be found in the leaf cups of bromeliads, recorded about 250 species of animals that have been found in this habitat in various parts of the world. This list of species includes representatives from such groups as the rotifers, oligochaete worms, leeches, planarians, ostracods, copepods, isopods, Onychophora, Myriapoda, Acarina, Phalangida, Pseudoscorpionida, scorpions, spiders, gastropods, insects, and amphibians. Of these, the insects were by far the most largely represented.

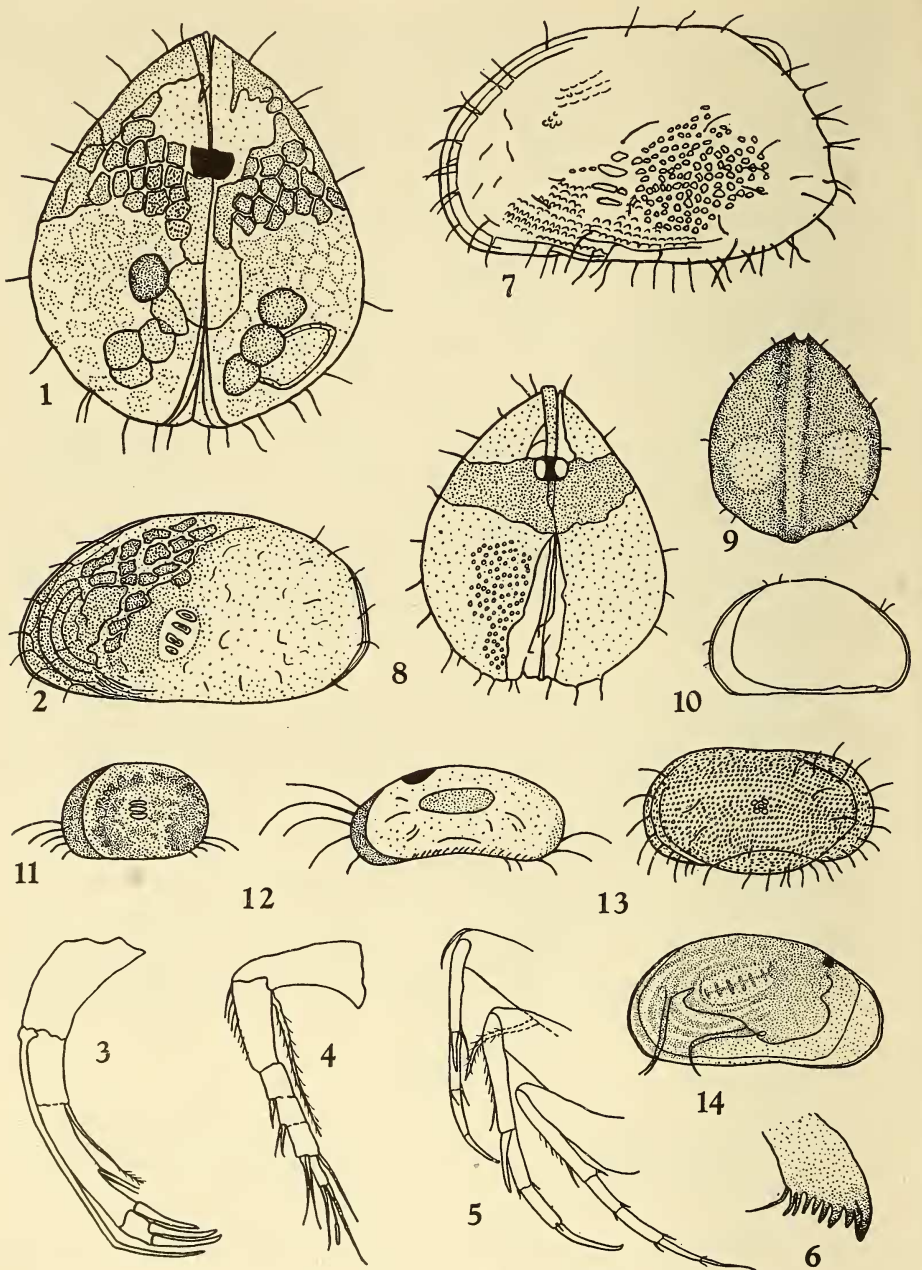
In Brazil, Müller (1881) found an ostracod that he described as *Elpidium bromeliarum* (Figs. 9, 10) but that has since been found to be a species of the already discovered genus *Metacypris*. Only one species of this genus (*M. cordata*, Figs. 7, 8) was known from northern Europe and Hungary, where it was an inhabitant of shallow water along the shores of lakes (G. W. Müller, 1900). It was subsequently found in England as well. A variety of the European species (*M. cordata neocomensis*) was described by Thiebaud (1906) from Switzerland, and an American species (*M. americana*, Fig. 13) by Furtos (1936) from the cenotes of Yucatan. A fourth species is described herein.

Picado found two genera of ostracods in Costa Rica: A species of *Metacypris* (Fig. 11) found at La Mica at 1,500 meters elevation, a form that was considered to be closely related to *M. bromeliarum*, and a species that was referred to the genus *Candon* (Fig. 12) but that was not described. In the present paper the occurrence of another species of ostracod (*Candonopsis kingsleyi*) is recorded from the leaf cups of bromeliads, which brings the total number of ostracod species found in this habitat to three, or perhaps four if Picado's *Metacypris* can be considered a distinct species.

Ostracoda and Entomostraca in general have been found in many strange and unexpected places, the leaf cups of bromeliads being only

TABLE 1.—A COMPARISON OF THE KNOWN SPECIES OF METACYPRIS

Character	<i>cordata</i>	<i>bromeliarum</i>	<i>americana</i>	<i>maricaoensis</i>
Shell-profile	Ovoid Height = $\frac{5}{8}$ length Highest = posterior $\frac{3}{8}$	Ovoid Height = $\frac{5}{8}$ length Highest = in middle	Ovoid Height = $\frac{1}{2}$ length Highest = in middle	Ovoid Height = $\frac{1}{2}$ length Highest = in middle
Ends of valves	Both broadly rounded	Posterior = broadly rounded Anterior = less rounded	Both broadly rounded	Posterior end broadly rounded Anterior end not so much so
Dorsal margin	Nearly straight	Arched	Gently arched	Arched
Ventral margin	Sinuated but covered in part by bellied sides	Same as <i>cordata</i>	Same	Same
Shell-dorsal view	Very tumid Width = $\frac{2}{3}$ length Anterior end pointed Posterior end rounded	Very tumid Width = $\frac{2}{3}$ length Anterior end less pointed than <i>cordata</i>	Very tumid — Same	Similar to <i>cordata</i> Width = $\frac{2}{3}$ length Similar to <i>cordata</i>
Shell-surface	Small round pits Strong hairs	Smooth, no pits Few hairs	Pits present Few long stiff hairs	No pits, covered with a pattern of polygonal areas in anterior half Broad band of polygonal areas over dorsal shell margin. Few hairs.
Color	Posterior half = dark grayish brown Greenish mixture in middle Broad light band dorsal border	Not given	Gray	Gray, polygonal areas brown
Length	0.56 mm	1.2-1.3 mm	0.55 mm	0.78 mm
First antenna	Slender Six segments Spine on second segment poorly developed	Five segments Dorsal border of first segment terminates in a thickly haired wart Spine reaches to middle of fourth segment	Five segments Spine reaches to middle of terminal claw	Five segments Spine reaches to middle of fourth segment
Second antenna	Exopodite well developed, reaches to tips of claws	Same as <i>cordata</i>	Exopodite long, slender, reaches beyond tips of terminal claws	Exopodite well developed, reaches to tips of terminal claws
Mandibular teeth	Four to five teeth, each with 2 or more points	Seven teeth	Seven teeth, each split	Eight teeth, not split
Thoracic legs	Broad at base	Similar	Similar	Similar to others



Figs. 1-6.—*Metacypris maricaoensis*, n. sp.: 1, Dorsal view, female; 2, left valve, female; 3, second antenna, female; 4, first antenna, female; 5, thoracic legs, female; 6, mandibular teeth, female. Figs. 7-8.—*Metacypris cordata* G. W. Müller: 7, Left valve, female; 8, dorsal view, female. Figs. 9-10.—*Metacypris bromeliarum* (Fr. Müller): 9, Dorsal view, female; 10, left valve, viewed from within, female. Fig. 11.—*Metacypris* sp. (from Costa Rica). Fig. 12.—*Candona* sp. (from Costa Rica). Fig. 13.—*Metacypris americana* Furtos, right valve, female. Fig. 14.—*Candonopsis kingleyi* Brady and Robertson, lateral view, male. (Figs. 7-8, after G. W. Müller; 9-10, after Fr. Müller; 11-12, after Picado; 13, after Furtos.)



one of the many peculiar habitats that these creatures select for their life abode. Some species have been found only in these strange places, a fact clearly brought out in an interesting recent paper by Scourfield (1938).

The material reported upon in the present paper was sent to the author for identification by Dr. Waldo L. Schmitt, curator of marine invertebrates, U. S. National Museum. The collections had been made in the Maricao National Forest in Puerto Rico in 1936 and 1937 by Prof. George S. Tullock, of Brooklyn College, and Prof. W. A. Hoffman, of the Columbia School of Tropical Medicine, San Juan.

The slides of the dissected ostracods and the specimens in alcohol have been deposited in the U. S. National Museum as type specimens.

#### Suborder PODOCOPA

#### Family CYPRIDAE: Subfamily CYPRINAE

#### Genus *Candonopsis* Vavra, 1891

Laterally compressed forms with thin shells. Anterior antennae, slender; posterior antennae, with penultimate joint subdivided, natatory setae poorly developed. Mandibular palp long and slender with a much-produced terminal joint. Maxillipeds with a vibratory plate bearing three thick, plumose setae; palp in male transformed as in *Candona* into a prehensile organ. Dorsal margin of furca without setae.

This genus includes one species found in Europe and several from the Southern Hemisphere.

#### *Candonopsis kingsleyi* (Brady and Robertson) Fig. 14

*Candona kingsleyi* (part) Brady and Robertson, Ann. Mag. Nat. Hist. (ser. 4) 6: 17, pl. figs. 11, 12. 1870.

*Candonopsis kingsleyi* Vavra, Sitzber. Böhm Ges., 1891, p. 162.

*Candonopsis kingsleyi* Müller, Zool. 30: 38, pl. 6, figs. 6, 7, 23-28; pl. 7, figs. 22, 25. 1900.

*Specific characters.*—*Female*: Seen from the side, reniform with rounded ends, highest a little posterior to the middle. Posterior end slightly more broadly rounded than the anterior end. Dorsal margin forming an evenly rounded curve; ventral margin slightly concave. From above, very narrow with greatest width slightly behind the middle; anterior end somewhat more pointed than the posterior. Valves with very smooth shiny surfaces and with a few fine hairs. Inner duplicatures very broad, particularly at the anterior end where the inner edge forms an almost vertical line. Anterior antennae long and slender; posterior antennae also slender. Mandibular palp with terminal joint narrowly produced and of about the same length as the preceding joint. Maxillipeds with tapering palp exhibiting a very small terminal joint. Second pair of legs with the two shorter bristles of unequal length, the shorter being less than one half the length of the other. Furcal rami very narrow and slightly curved, without dorsal seta; claws without strong teeth.

*Male*, somewhat larger than the female. Prehensile palps of maxillipeds

short and thick and slightly unequal, the right being broader. Copulatory appendages terminate in two unequal lappets, the upper one being larger and of triangular shape. Ejaculatory tubes are very large and conspicuous and are distinctly visible through the transparent shell. Color whitish, translucent. Length of male, 1.06 mm; height, 0.54 mm; width, ca. 0.20 mm. Female slightly smaller.

*Occurrence.*—From bromeliads, Maricao National Forest, Puerto Rico, 2,800–3,000 feet elevation, December 1937.

*Distribution.*—Sweden, British Isles, Germany, Bohemia, Switzerland, Siberia.

### Family CYTHERIDAE

#### Genus *Metacypris* Brady and Robertson, 1870

*Metacypris* Brady and Robertson, Ann. Mag. Nat. Hist. (ser. 4) 6: 19. 1870.

*Elpidium* F. Müller, Arch. Mus. Nac. Rio de Janeiro 4: 27. 1881.

*Metacypris* G. W. Müller, Zool. 30: 95, pl. 21, figs. 1–9. 1900.

*Metacypris* Thiebäud, Zool. Anz. 29: 799. 1906.

*Metacypris* Furtos, Carnegie Inst. Washington Publ. 457: 114, figs. 31, 32, 44–46. 1936.

Very short broad shells; right valve with toothed anterior and posterior margins. First antennae with five or six segments. Second antennae, four segmented, the exopodite jointed. Mandibles with obscurely segmented palp. Maxilla with three masticatory processes and a shorter palp; branchial plate without aberrant or orally directed setae. Furca of female with three setae.

#### *Metacypris maricaoensis*, n. sp.

Figs. 1–6

*Specific characters.*—*Female*: From the side, oval in outline with greatest height at about the center. Dorsal margin broadly arched, ventral margin almost straight. Both ends rounded, the posterior end being more broadly rounded than the anterior, which shows a pronounced slope from the dorsal margin. Seen from above, very tumid with broadly rounded posterior and more tapered anterior ends. Large fused eyes very prominent. Valves smooth with a few scattered, strong hairs. Color, gray with a much darker area in the anterior half of the valve which consists of a band of polygonal shaped, dark brown areas across the two valves at the region of the eyes. First antenna with five segments, the spine on the second segment well developed and reaching to the middle of the fourth segment. Second antenna with well developed exopodite which reaches to the tips of the terminal claws. Mandible with eight teeth which show no evidence of being split. Thoracic legs broad at the base and in other respects similar to those of other members of the genus.

Length of adult female, 0.78 mm; height, 0.39 mm; width, 0.64 mm.

*Male* unknown.

*Occurrence.*—Numerous specimens were taken from leaf cups of bromeliads in the Maricao National Forest, Puerto Rico, at an elevation of 2,800–3,000 feet, January 28, 1936, and December 1937. Female holotype, U.S.N.M. no. 80029.

*Remarks.*—This species is evidently closely related to *M. cordata* but differs from it in several important respects, viz. the greater size, shape of the shell and the color markings, the absence of pits on the valves, and the marked difference in the mandibular teeth.

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ICHTHYOLOGY.—*Kraemeria bryani*, a new species of trichonotid fish from the Hawaiian Islands.<sup>1</sup> LEONARD P. SCHULTZ, U. S. National Museum.

The reference of genera of fishes to the family Trichonotidae by various authors from time to time has frequently been the result of inadequate material for comparison of their anatomical characters. The genera centering around *Kraemeria* have features that resemble the trichonotids more than the gobiids, and this has influenced me to place them in a subfamily. However, *Paragobioides* Kendall and Goldsborough has been referred to this group by Fowler, but it certainly does not resemble any of the trichonotids except by its elongated body and numerous fin rays. Some pores over the eye, no lateral line, and the restricted gill opening cause me to conclude that *Paragobioides* is nearer the Gobiidae than the Trichonotidae. Its true relationship will be determined no doubt from a study of its skeleton, and until that is done I propose to consider it tentatively as a distinct subfamily. Thus I am inclined to believe that Hora (Rec. Indian Mus. 27 (pt. 6): 455. 1925) in referring *Paragobioides* to the subfamily Taenioidinae under the Gobiidae is close to the true relationship of this species.

In order to separate the various genera referred to the family at various times (from a practical viewpoint) and to indicate some of the relationships between Hawaiian, Samoan, and Phoenix Island material, I have prepared a key and incorporated the various genera as noticed by me in the literature.

- 1a. Lateral line present, below the midaxis at least posteriorly; lower jaw shortest, snout projecting in front of the thin and weak lower jaw; tip of tongue free, narrow and pointed, not bilobed; gill membranes extending far forward, free from isthmus (LIMNICHTHYINAE).

<sup>1</sup> Published by permission of the Secretary of the Smithsonian Institution. Received March 25, 1941.